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Electronic Supporting Information

For

Zeolitic Imidazole Framework (ZIF)-Sponge Composite prepared *via* a Surfactant-assisted Dip-Coating Method

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Text S1. Kinetic analysis of the weight change owing to ZIF-loading on sponges

The pseudo first order rate law can be expressed as follows (Eq. (S1)):

$$\ln(q_e - q_t) = \ln q_e - \frac{k_1}{2.303} t \qquad \text{(S1)}$$

where qt denotes the weight change at a given dip-coating time t, qe is the weight change at equilibrium and k_1 (min^{-1}) represents the pseudo first order rate constant. The pseudo second order rate law typically can be described in the following equation (Eq.(S2)):

$$\frac{t}{q_t} = \frac{1}{k_2 q_e^{\,2}} + \frac{t}{q_e} \qquad \text{(S2)}$$

where k_2 (g g^{-1} min^{-1}) denotes the pseudo second order rate constant.

Text S2. Measurement of hardness of sponge

The hardness of sponge was measured by a classical style durometer (PTC® instrument, the Model 302SL, USA). By using such a durometer, the testing sponges of 2.5 cm × 2.5 cm × 2.5 cm dimensions were particularly prepared. A piece of sponge was placed on the measurement stage, and then the sponge and the stage were lifted up to contact with the durometer gauge to measure and to record the hardness of the testing sponge. The unit for the hardness measurement using this classical durometer is gram-force per square centimeter (*i.e.*, gf cm^{-2}).

Text S3. Adsorption isotherm of MG to ZIF-sponge, analysis using the Langmuir isotherm model and recyclability test.

The adsorption isotherm of MG to ZIF-sponge was measured by mixing a fixed amount of ZIF-sponge (0.01 g) with various initial concentrations (C_0) of MG solutions (0.02 L), ranging from 100 to 500 mg L^{-1}. The batch-type adsorption experiments were performed for 6 hr at 25 °C and 300 rpm to ensure the adsorption

equilibrium. The remaining concentration of MG at equilibrium (C_e) was analyzed using a UV-Vis photospectrometer (Chrom-Tech CT-2000, Taiwan) at a wavenumber of 633 cm^{-1}. The adsorption capacity at equilibrium, q_e (mg g^{-1}), of ZIF-sponge was calculated as follows (Eq. (S3)):

$$q_e = \frac{V\left(C_0 - C_e\right)}{W} \qquad \text{(S3)}$$

where W (g) is the amount of ZIF-sponge added in the adsorption experiment; V (L) is the total volume of solution. In order to estimate the maximal adsorption capacity of ZIF-sponge, we further employed the Langmuir isotherm to analyze the adsorption isotherm as follows (Eq. (S4)):

$$\frac{C_e}{q_e} = \frac{1}{K_L q_{\max}} + \frac{C_e}{q_{\max}} \qquad \text{(S4)}$$

where K_L is the Langmuir isotherm constant; $q_{\max}$ represents the estimated maximal adsorption capacity.

The recyclability of ZIF-sponge for the MG adsorption, the used ZIF-sponge was regenerated by washing it with ethanol. First, the used ZIF-sponge (0.01 g) was added to 0.04 L of ethanol and stirred at 25 °C for 8 hr. Subsequently, the ZIF-sponge was washed with 0.04 L of ethanol thoroughly and dried at 65 °C in a conventional oven. The regenerated ZIF-sponge was then used in another batch of MG adsorption experiment (C_0 = 500 mg L^{-1}) at 25 °C.

Text S4. Characterization of ZIF-sponges and evaluation of leach-out from ZIF-sponge during the adsorption and regeneration.

N_2 adsorption/desorption isotherms were measured by a volumetric sorption analyzer (Porous Materials, Inc., USA) at a relative pressure (P/P0) range of 0.0001−0.99.

The leaching-out of cobalt from ZIF-sponge during the MG adsorption and ethanol-washing regeneration processes were monitored by using an atomic absorption spectrophotometer (Perkin Elmer AA100, USA).

Table S1. Kinetic modeling parameters for ZIF-loading on sponge *via* the self-assembly process.

Conditions	Pseudo-first-order			Pseudo-second-order		
Surfactant	k_1 (min^{-1})	Weight change at equilibrium	R_1^2	$k_2 \times 10^6$ ($g\ g^{-1}\ min^{-1}$)	Weight change at equilibrium	R_2^2
SPAN	0.041	65.1	0.988	0.61	78.1	0.988
SDBS	0.033	96.9	0.978	0.30	118.7	0.992
CTAB	0.008	28.6	0.978	0.11	45.4	0.980
T-100	0.041	11.4	0.984	3.41	13.7	0.996

Table S2. BET specific surface areas of ZIF-sponges, ZIF-67 nanocrystal and melamine sponge (the ZIF-sponges were prepared using 4000 mg L^{-1} of surfactant for the surface modification).

Material	BET specific surface area ($m^2\ g^{-1}$)
Pristine ZIF-67	1710
Melamine sponge	< 1
ZIF-sponge-SPAN	878
ZIF-sponge-SDBS	560
ZIF-sponge-CTAB	393
ZIF-sponge-T-100	492

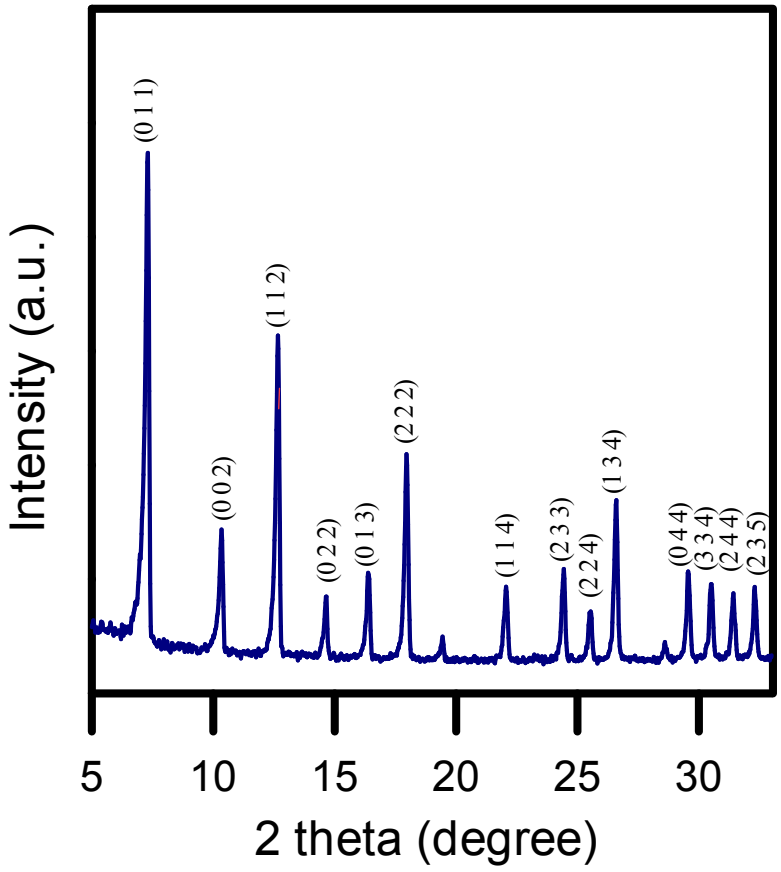

Fig. S1.XRD pattern of the as-synthesized ZIF-67 nanocrystals.

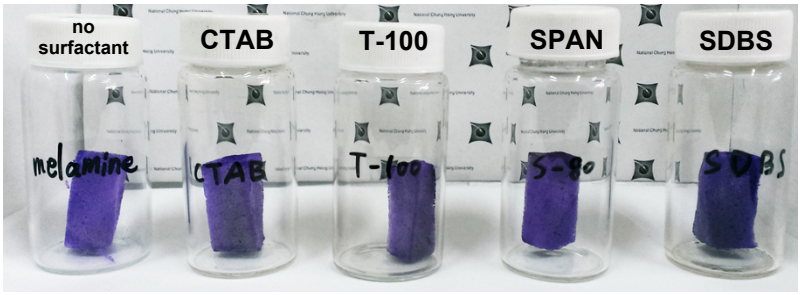

Fig. S2. Pictures of ZIF-sponges prepared with the assistances of various surfactants.

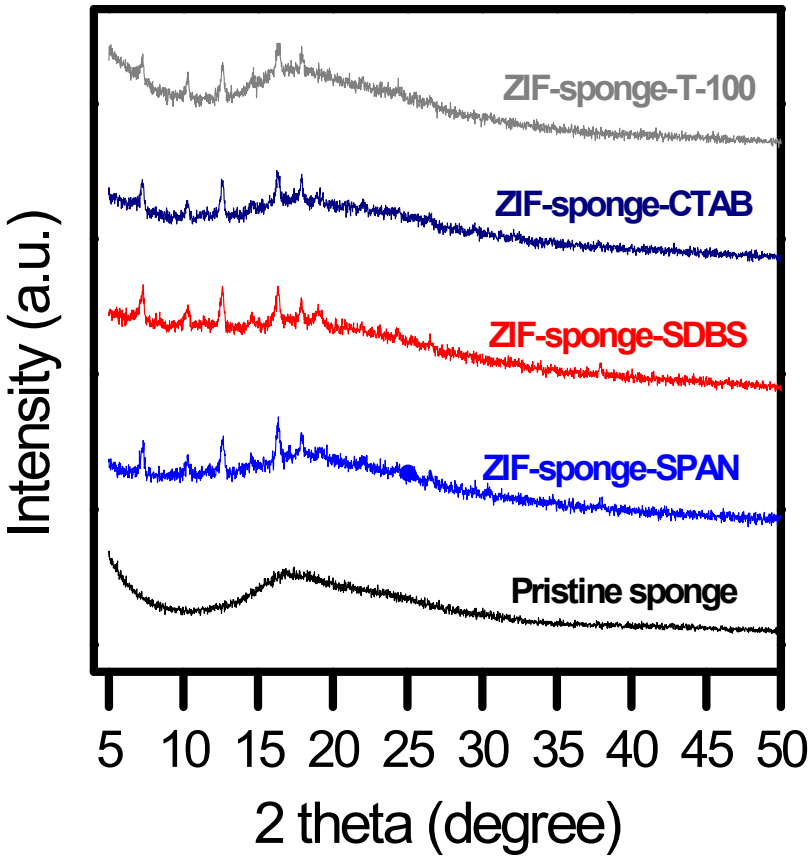

Fig. S3.XRD patterns of the pristine sponge and ZIF-sponges.

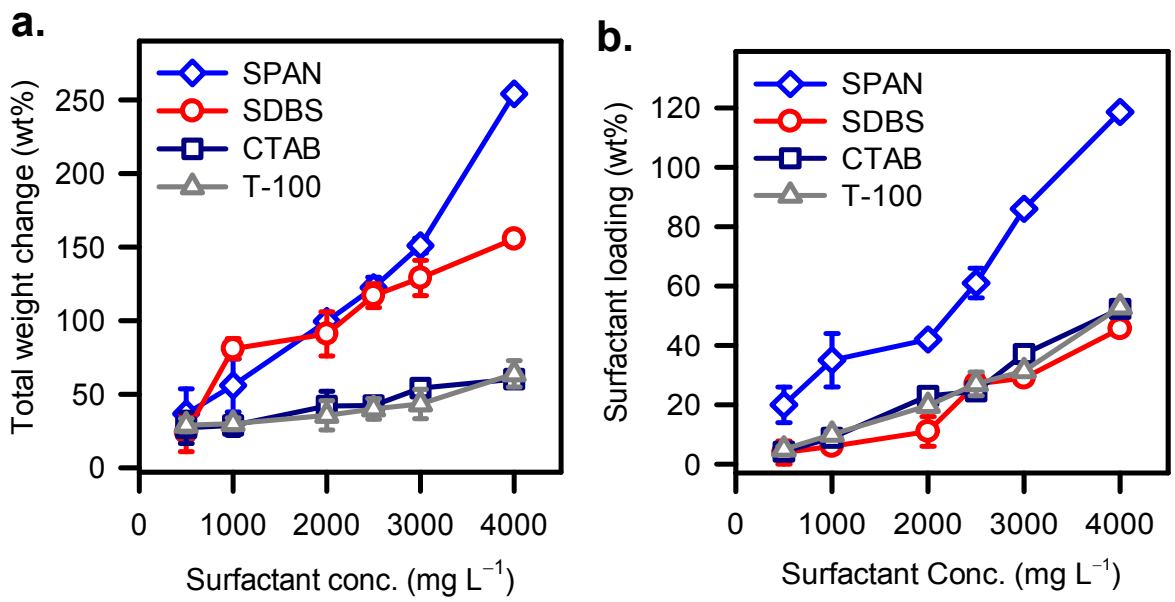

Fig. S4. Effects of surfactant type and concentration on (a) total weight change of ZIF-sponge from surfactant and ZIF-67 and (b) weight change of sponge from surfactant loading.

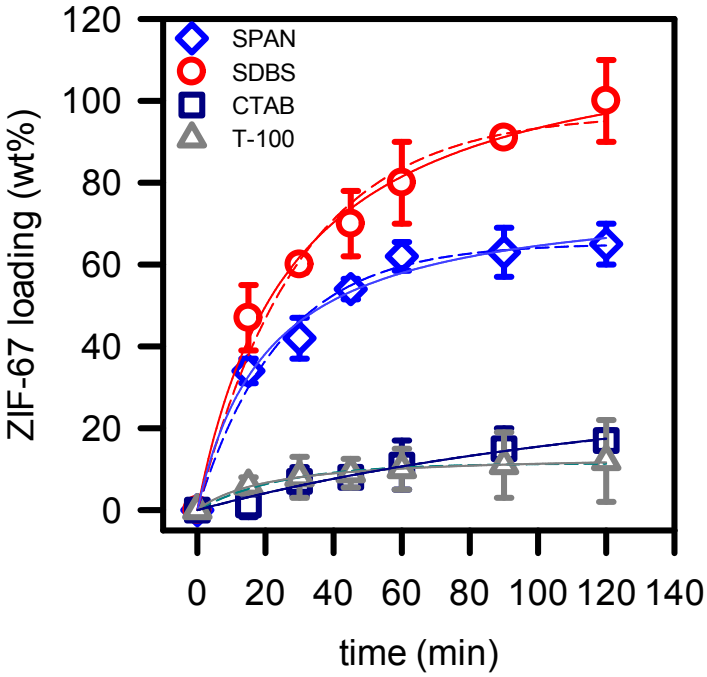

Fig. S5. Effect of dip-coating time on the ZIF-loading onto various surfactant-modified sponges (surfactant: 3000 mg L^{-1}) at ambient temperature. The dashed lines represent the fitting results using the pseudo first order rate law whereas the solid lined represent the fitting results using the pseudo second order rate law.

Fig. S6. A picture of sponge durometer used to measure the hardness of sponges.

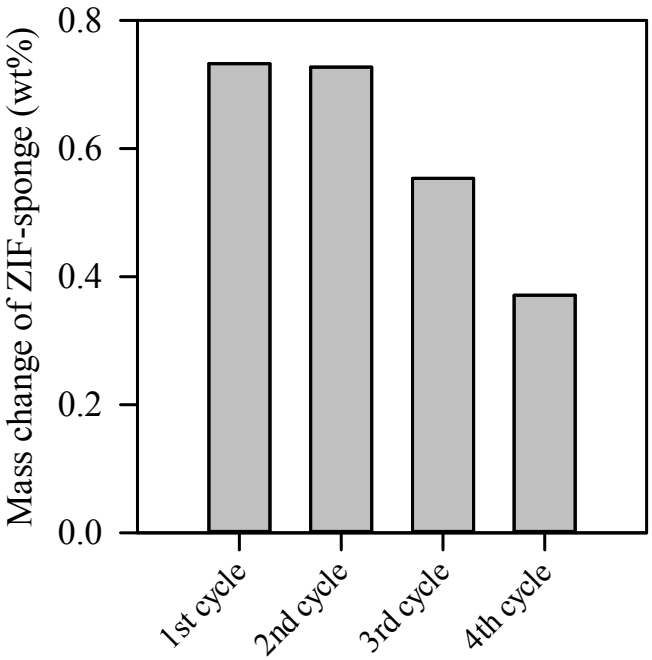

Fig. S7. Mass change of ZIF-sponge (ZIF-sponge-SDBS) during the four cyclic adsorption test (the weight change due to the MG adsorption has been subtracted).